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Review**Diagnostic potential of breath analysis—focus on volatile organic compounds**Wolfram Miekisch^{✉, ✉}, Jochen K. Schubert^{✉, 1} and Gabriele F. E. Noeldge-Schomburg^{✉, 2}

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Abstract

Breath analysis has attracted a considerable amount of scientific and clinical interest during the last decade. In contrast to NO, which is predominantly generated in the bronchial system, volatile organic compounds (VOCs) are mainly blood borne and therefore enable monitoring of different processes in the body. Exhaled ethane and pentane concentrations were elevated in inflammatory diseases. Acetone was linked to dextrose metabolism and lipolysis. Exhaled isoprene concentrations showed correlations with cholesterol biosynthesis. Exhaled levels of sulphur-containing compounds were elevated in liver failure and allograft rejection. Looking at a set of volatile markers may enable recognition and diagnosis of complex diseases such as lung or breast cancer. Due to technical problems of sampling and analysis and a lack of normalization and standardization, huge variations exist between results of different studies. This is among the main reasons why breath analysis could not yet been introduced into clinical practice. This review addresses the basic principles of breath analysis and the diagnostic potential of different volatile breath markers. Analytical procedures, issues concerning biochemistry and exhalation mechanisms of volatile substances, and future developments will be discussed.

Author Keywords: Alkanes; Aldehydes; Breath analysis; Gas chromatography; Isoprene; Lipid peroxidation; Volatile organic compounds (VOCs)

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